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De aminozuursamenstelling van enige menselijke haemoglobinen

van der Schaaf, Popko Cornelis

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SUMMARY

One of the most important problems in the philosophy of science is formed by the question, to which extent scientific formulas and signs can tell us something about reality, and if in general our theories can approximate reality as it is in itself. This problem of truth in science is the problem of the relation between signs, theory and reality.

It is the object of this work to give to this problem a satisfactory solution, which is based on *philosophical anthropology*.

In the course of the last century many answers to these questions have been proposed. Some of them have been discussed in chapter 2.

Neopositivism conceives a scientific theory as a fabric of propositions, which can be reduced partly to logical and mathematical tautologies, partly to elementary propositions which are verifiable by our sense-organs. An elementary proposition is said to be *true*, when its structure corresponds with that of a fact in reality. Thus a true proposition is a *representation* of the structure of a fact. Non-verifiable propositions are said to be meaningless, e.g. the logical and mathematical tautologies.

This neopositivistic conception however leads to an unsolvable difficulty. The criterion of meaningfulness of a proposition has such consequences, that the statements of neopositivism itself must be meaningless. The deeper cause of this difficulty is found in the fact, that the problem of the relation between propositions (formulas) and reality cannot be solved within the framework of science or logic itself.

The discussion of the work of BRIDGMAN, MARGENAU and GONSETH demonstrates, that there cannot be a direct correspondence between signcomplexes and reality. They are always separated from each other by a *construct*, i.e. a structure-design, which is the result of human activity. A signcomplex is not a direct representation of a structure in reality, but first of all of a structure which is designed by man. Such structures make it possible for man to have a definite vision on reality and to control and manipulate it in certain ways.

In the chapters 3, 4 and 5 an analysis of sign- and structure-systems

in *chemistry, mathematics* and *physics* confirms the thesis mentioned above. It is shown that a scientific theory is a *structure-system*, designed by man, and consisting of a small number of species of elements and relations between them. Within such a system it is possible to design structures by putting together some of its elements and relations. The structure-system is a *reiteration-system*: the same elements and relations are repeated in all structures which can be designed. Sometimes there are several *levels of structure* in the system: some complexes of the first order are taken as elements to form complexes of the second order, etc. Complexes of lower order are called *patterns*.

In chemistry and physics only such systems are designed, as to make it possible to conceive reality as a (isomorphic or homomorphic) *model* of these systems. In mathematics however one is only concerned with the reiteration-systems *as such*, especially with those which can be axiomised and which have a deductive character.

The *sign-systems* which are used in science consist of a small number of species of object- and relation-signs, and are always models of the structure-systems, to which they belong. By means of sign-complexes, which are combinations of object- and relation-signs, structures designed within the framework of a reiteration-system can be represented. This representation is essentially an identity of the designed structure with the spatial structure of the sign-complex. The fabric of relations and elements of the represented structure-design can be found again in the spatial arrangement of the object- and relation-signs into a sign-complex.

In chapter 6 it is shown, that reiteration- and sign-systems also play an important role outside the realm of science. Wherever a survey and a technical control over a certain domain is required, designment and use of such systems are necessary. One should think of the writing of notes in music, of the alphabet, of normalisation in technics, etc.

In addition to system-signs there is another kind of signs, which are called *individual signs*: indications, symptoms, signals, gestures, also the indication of a dial in the course of an experiment. Whereas system-signs have no direct relation to the represented reality, individual signs form a concrete part of the situation, in which they act as signs. By means of an individual sign one can design a *centered structure*, in which the sign is the centre; from this centre a number of relations jump in several directions, which connect it with other elements. With such a centered structure orientation in the situation is possible. Every element, every relation of the centered structure and also the structure itself is repeatable; reiteration-system and centered structure are always interwoven with each other.

Sometimes also phenomena such as images, expressions, symbols, languages, etc. are called signs. Such a subsumption cannot be maintained against a more accurate phenomenological analysis. Many essential differences with system- and individual signs are shown. In this book only these two kinds are designated by the name „sign”.

A further analysis of the conception of structure makes it clear, that structure and sign can only be understood, if one uses *philosophical anthropology* as a starting-point. The basis of this anthropology is formed by PLESSNER's thesis of the *eccentric position of man*. Man is never totally absorbed in a situation, but keeps always a certain distance to it; each situation, every object or element in it, may be repeated elsewhere and at some other time; the situation is one among many other possible situations. The human body is a medium, by which contact with the world is possible, but at the same time it is a thing among the other things in the world. Human contact with the world has the character of *indirect directness*.

With this anthropological thesis as a startingpoint, the following principles of a philosophy of sign and structure can be derived: Every contact of man with the world, every „Anschauung”, i.e. perception, conception, orientation, vision, survey, theory, etc. is possible only by means of structure-systems and of centered structures which are interwoven with these systems. The structures, which are found in the world of perception, can be disengaged from the perceived objects and facts; with the elements of these structures one can design new structure-systems, and the centered structures which are possible within these systems can be compared with those of the perceived objects in the world. All structures have a spatial character; therefore they are always tied to human sense-organs in some way or other, even in the most abstract cases. Thus man must *represent* the designed structures somehow, e.g. by means of sign-complexes with a spatial order.

Chapter 8 gives a final analysis of the relation between sign, structure and reality in science.

Starting with structures that are given to us in the perceived world, science isolates a number of definite elements and relations; with these a reiteration-system is designed, in which structures are possible, that can be compared with partial structures in the perceived world, by means of experiments. Now it is attempted to underlie new systems to the first, so that finally there is a system with several levels of structure; only those complexes, which are of the highest order are comparable with partial structures in the

perceived world, by means of experiments, which themselves are directed by the system. Thus a theory is never a passive imitation of reality, but the result of creative activity of man.

Only complexes of the highest level of structure are comparable with the structures in the world of perception. Verification of a theory therefore is always indirect, fragmentary, partial and approximate. Taking these restrictions into account, a theory is said to be true, if there is identity between the complexes of the highest level, which are possible within the theory, and selected structures in the world of perception. In this case the representing sign-complexes and formulas are true too. However, one should never forget, that every theory is the result of a process of selection, and therefore it can show us only a single aspect of the world.